

Offshore UK

Farmin Opportunity - Under Appraised Development 134 MMBO Contingent Resources with large 5 BBO exploration upside

Licence P2321, Devil's Hole Horst, Quads 27/28

Disclaimer: Volumes, STOIIP, Recovery Factor, Resources estimates are based on interpretation of current database and subject to change as project matures with more data. It could get smaller or bigger.

Hydrocarbon Play Concept: The DHH prospect is an "overlooked basin margin play concept" proven to occur at Lundin/Equinor's giant Johan Sverdrup oil field (2.2 to 3.2 BBO) discovered in 2010. Johan Sverdrup proves long distance (30 to 70kms) oil migration can occur from the mature Jurassic Graben kitchens.



Figure 1 Regional seismic line through Johan Sverdrup and DHH prospect

STOILP: The Devil's Hole Horst Upper Jurassic Sand prospect is estimated to contain **5.7 BBO**. The Lower Zechstein Dolomite Z1 prospect is estimated to contain **14.6 BBO**. The Upper Zechstein Dolomite Z3 is estimated to contain **669 MMBO**.

Resources: Using reasonable recovery factors, of 40% and 20%, **2.3 BBO Prospective Resources** are estimated in the Jurassic Sand, **134 MMBO Contingent Resources** are defined in the Z3 Dolomite and **2.9 BBO Prospective Resources** in the Z1 Dolomite.

Subsurface Risks: Chance of success is estimated as 34% for the Upper Jurassic Sand

prospect, 75% for the discovery at Z3 level and 60% for the Z1 exploration prospect.

Risk has been reduced by fluid inclusion study initial results. Trap, Seal, Source and Reservoir presence have been proven by Amoco well 27/3-1 and 27/10-1. Reservoir effectiveness, deliverability and connectivity are defined as the main risks. These studies are expected to be ready by end January 2019.



Figure 2 Fluid Inclusion initial results (Dec 2018) on two vintage wells reveal Zechsteinkalk oil and condensate column in both wells

Ownership: North Sea Natural Resources (NSNR) is seeking partners for its 100% owned and operated oil Production Licence P2321, Offshore UK. The licence comprises 7 UK Blocks: 27/3, 27/4, 27/5, 27/9, 27/10, 28/1 and 28/6.

Link to License Agreement:

UK OGA Licence P2321

Exploration History: The area was originally licensed in the mid 1960's by Amoco who were awarded almost the same seven blocks over the Devil's Hole Horst structure.

The first Amoco well was an oil discovery in Zechstein Dolomite. It found evidence for a 14.5 feet hydrocarbon pay zone with good oil and gas shows.

The second Amoco well on the licence was drilled downdip on the structure and was targeting Rotliegendes sand. It was poorly located for the target but found thick reservoirs – a water wet Jurassic sand and Lower Zechstein Dolomite with a pay zone.

1967 DST Results: The Discovery well 27/3-1 was drilled between 1st July and 8th September (70 days) 1967. It found sufficient evidence of hydrocarbons, comprising oil shows, cuttings gas plus open hole log data covering one pay zone, to justify three Drill Stem Tests. The DST's did not flow.

The well had not been designed to test the Zechstein Dolomites as the primary target was Rotliegendes Sandstone. The reservoir was seriously compromised by the casing cement job performed immediately prior to the first two DST's. DST 3 covered a zone of oil shows but detailed petrophysics suggests these were in thin anhydrites which were poor quality and unlikely to flow.



Figure 3 DST Compromised by a 2" cement sheath



Figure 4 27/3-1 (water-based mud) Upper Zechstein Dolomite Gas Pay zone 14 feet net pay and 27% average porosity with 76%

average oil saturation, with shows and thin pay zones suggesting a 550 feet oil column nearby.

P2321 Evaluation: Three main prospects have been defined at Jurassic Sand level, Upper Zechstein and Lower Zechstein Dolomites.

Database: Two released wells within the licence area. Over 3000kms of 2d seismic data in and around the P2321 License. This comprises: 2016 Proprietary released OGA WesternGeco data, 1988 BP, 1990 Fina, 1960's Amoco, and licensed 1980's WesternGeco and 2004 TGS spec data.



Figure 5 Database Map - 2 wells and 2700kms 2d seismic with location of well tie line



Figure 6 Well Tie Line through two old Amoco wells

Prospects: <u>The Jurassic sand prospect</u> is a large stratigraphic closed structure with an area of 282 sq kms. Clear seismic character seen at the 27/10-1 well that can be mapped around most of the block. Top and base sand can be interpreted enabling good definition of GRV. Jurassic sand reservoir is proven in well



27/10-1 but absent in the updip 27/3-1 well (bald Triassic high).



Figure 7 Top Upper Jurassic Sand Depth Structure – 2.3 BBO Prospective Resources

<u>The Upper Dolomite Z3 prospect</u> is not so easily mapped being too thin for seismic resolution and not present in 27/10-1. The reservoir appears from seismic character to be discontinuous. It is a four-way dip closure at Top Salt level but interpreted to be a discontinuous reservoir from amplitude character. A logged oil down to is seen in the 27/3-1 discovery well.



Figure 8 Top Z3 Upper Dolomite – 134 MMBO Contingent Resources

<u>The Lower Dolomite Z1 prospect</u> is mapped across the whole area and is seen to occur in both wells. Well 27/10-1 has a logged OWC at 1431m which corresponds with a four-way dip closure on the Zechstein Dolomite Z1 map.



Figure 9 Z1 Lower Dolomite Zechstein Depth Structure – 904 sq kms (223,000 acres) fourway dip closure.

Petrophysics:

27/3-1: Z3 Dolomite

One pay zone (net pay 14.5 feet) is defined in the updip discovery well 27/3-1.



Figure 10 27/3-1 Z3 Upper Dolomite Pay Zone -76% Oil Saturation 27% Porosity 14.5 feet net thickness and good oil shows.

Good hydrocarbon indications in the form of oil shows, cuttings gas plus logged hydrocarbon in porous zones were identified in the discovery well. Detailed petrophysics reveal average oil saturations of 76%.

27/10-1 Z1 Dolomite

The downdip exploration well 27/10-1 found 15% porosity 50m net reservoir thickness Zechstein Z1 Dolomite reservoir with an oil water contact at a depth of 4692 feet tvdss (1431m) tvdss.

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Figure 11 27/10-1 Lower (Z1) Zechstein Dolomite - Average Porosity - 15%, 1-SW – 40%, 17.5 feet Net Pay, OWC at 4692' tvdss – 1431m tvdss

The downdip well, 27/10-1, penetrated an Upper Jurassic Sand at a depth of 3510' MD with 78 feet gross thickness and high 94% N/G porous sand.



Figure 12 27/10-1 Jurassic Sand

The average oil saturation is difficult to determine due to poor logging, lack of core or sidewall core and glauconite conductive mineral. It is interpreted as water wet at this location although there could be residual oil saturations. A Water Up To depth of 1041m tvdss is used as a maximum case in the volumetrics.

Further Upside: Further upside exists in three additional reservoirs: Zechstein Z2 Dolomites, Rotliegendes Sand and Fractured Basement.



Figure 13 Oil Seeps Slicks from satellite data. Courtesy of CGG NPA Satellite Mapping

Work Programme: The Licence work programme comprises firm 700 2d on the shelf purchases (already exceeded) a contingent 3D seismic survey (contingent on finance). 2 Wells and a test are intended, costed and planned but are not a work commitment.

Licence P2321 is an Innovate licence with a sixyear term. The effective start date is May 2017 with a drill or drop decision after four years.

Offer: NSNR is offering equity in Licence P2321 in return for funding of a 3D survey plus two appraisal wells and a well test. NSNR is already in talks with two oil majors. NSNR plans to operate the seismic phase. The well test will establish oil quality and reservoir productivity. The cost for a complete 3D, covering 1580 sq kms, is \$6M to \$10M. The estimated cost for drilling two wells plus one test is \$35 million.

Further Information:

Access to key data on this opportunity can be made available following signing of a confidentiality/ non- disclosure agreement. Online and physical data rooms are available.

Prospex Fair Conference (Dec 2018) Presentation Talk:

PROSPEX Conference Talks - DHH Wednesday 14:30